

# ***FLOOD CLEANUP HEALTH TIPS***

*Montana Department of Public Health and Human Services  
Food and Consumer Safety Section  
(406) 444-2408*

*Montana Department of Environmental Quality  
Public Water Supply Section  
(406) 444-4400*

*HELENA, MONTANA 59620*

*In order to provide one convenient source of emergency health information for those who must return to, live in, and salvage flood-stricken homes, we have summarized in this brochure information released by various state and national agencies, as well as the recommendations of local health agencies. Several kinds of diarrheal illness and other communicable diseases are more common in areas experiencing flooding.*

*The major reasons are the use of unsafe water and unsafe food.*

## ***HEALTH & HYGIENE ISSUES***

***PAGES 8, 9, 10, & 11***

*ENTERING DAMAGED BUILDINGS  
CLEANING BEDDING & CLOTHING  
PERSONAL HYGIENE – MEDICINES  
IMMUNIZATIONS  
CLEANING UP AFTER A FLOOD  
EMERGENCY HOME SANITATION*

## ***SALVAGING DAMAGED FOODS – FOOD SAFETY***

***PAGES 4, 5, 6 & 7***

*STORED FOODS, CANNED GOODS  
DISINFECTING FOOD CONTAINERS  
REFRIGERATED FOODS  
FROZEN FOODS  
FOOD PREPARATION DURING FLOODS*

## ***MOSQUITO & VECTOR CONTROL***

***PAGES 12, 13, & 14***

*MOSQUITOES AS DISEASE VECTORS  
WEST NILE VIRUS  
GUIDELINE FOR MOSQUITO CONTROL  
MINIMIZING MOSQUITO ATTACK*

## ***DISINFECTING WATER***

***PAGES 2 & 3***

*DRINKING WATER  
DISINFECTING HOME WELLS  
HANDWASHING  
WATER TESTING  
CONTACTING WATER QUALITY/DEQ*

## *DISINFECTING WATER*

Handwashing is the single most important thing you can do to protect the health of yourself and other members of your household when cleaning up after a flood. For this you will need safe water.

### *DRINKING WATER*

All water possibly contaminated by flooding must be disinfected, whether from wells, springs or cisterns. Bottled water which has not been in contact with flood water may be used during cleanup, if available. Flooding often disables power or gas service along with other utilities, making it difficult to sanitize flooded wells and restore refrigeration. In such cases, bottled water may be the best choice for household water until utilities are restored. You may use your own bottles and fill them at a source known to be safe.

Other drinking water should be treated by one of the 2 methods given below (Note: if the water is excessively turbid (cloudy or colored), it may be difficult to sanitize it without boiling):

1. Boil water for five minutes and store in a clean container. The flat taste can be eliminated by shaking the water in a bottle or pouring it from one container to another.
2. Mix 5 drops of household bleach with 1 quart of water (or 20 drops per gallon) and let stand for at least five minutes (preferably 30 minutes to an hour) or longer before drinking. Bleach should be unscented and free of detergents or additives. This water will be suitable for drinking, hand washing, and for washing pots and utensils. An insulated beverage container with a bottom spigot is useful for storing a small supply of drinking and culinary water.

Public service announcements may indicate a source of water provided for the public as a part of the disaster response plan. If the National Guard or other government agency makes interim bottled or tanked water available to the public in your area, this may allow you time to sanitize and renovate your household water supply.

Once floodwaters have receded and power has been restored, wells, springs or cisterns should be adequately protected against all known sources of contamination before disinfecting the supply. Guidance for disinfecting various sizes and depths of wells are given on page 2, Table 1.

To disinfect most wells, mix two quarts of liquid household bleach with ten gallons of water and pour the contents down the well (inside the casing). If available, run a hose to the well and run water down the inside of the well casing, being sure to wet all of the interior well casing, for fifteen minutes. This will cause the chlorine to mix with the water in the well and will also allow you to disinfect all of the well casing. Replace well cover and turn on all water taps, starting with those farthest from the well and moving towards the well, until there is an odor of chlorine. Turn off the water and do not use it for eight hours. Then open all taps and spigots and flush out the chlorine. Keep flushing until the chlorine odor has disappeared. Do not flush chlorinated water into perennial streams or lakes. It is not advised to use your septic system for flushing chlorine water, but if you must, adjust the flow of faucets or fixtures that discharge into septic systems to a very low rate of flow to avoid overloading the system.

**TABLE 1 DISINFECTING HOUSEHOLD WELLS -- \*Using household bleach (5.25% )**

\*Household bleach (5.25 to 6%) should be mixed with water before adding to the well casing at the rate of 1 cup or less per 5 gallons of clear water; 2 cups to 1 quart in 10 gallons of clear water; and 2 or more quarts of bleach in 20 gallons of water. Then follow the steps given above.

Note: Depth of water in well is measured from the static water level to the bottom of the well.

-----DIAMETER OF WELL (INCHES)-----

DEPTH OF WATER IN WELL (ft)	4" CASING	6" CASING	8" CASING	24" DUG WELL	36" DUG WELL	48" DUG WELL
5 FEET	1 cup	1 cup	1 1/2 cups	4 cups	3 quarts	5 quarts
10	1 cup	1 cup	1 1/2 cups	3 quarts	6 quarts	2 1/2 gallons
15	1 cup	1 cup	1 1/2 cups	4 quarts	2 gallons	4 gallons
20	1 cup	1 cup	2 cups	5 quarts	-	-
30	1 cup	2 cups	4 cups	-	-	-
40	1 1/2 cup	2 cups	1 quart	-	-	-
60	2 cups	4 cups	2 quarts	-	-	-
80	2 cups	1 quart	2 quarts	-	-	-
100	3 cups	1 1/2 quarts	2 1/2 quarts			-
150	4 cups	2 1/2 quarts	4 quarts	-	-	-

**TABLE 1A Disinfectant Solutions Summary: (Household bleach 5.25% -- 6% sodium hypochlorite)**

- FOR SANITIZING DRINKING OR CULINARY WATER, HANDWASHING WATER, UTENSILS... 5 DROPS HOUSEHOLD BLEACH WITH 1 QUART OF WATER (20 DROPS/GALLON)
- FOR SALVAGING CANS, CLEANING FLOODED WALLS, SURFACES, COUNTERS, FLOORS, TOYS... 1 CUP OF BLEACH WITH 5 GALLONS\* OF WATER (2-3 TABLESPOONS/QUART)  
*\*Use protective gloves & glasses and rinse this solution from metal surfaces after 10 minutes to prevent corrosion.*
- FOR DISINFECTING FLOODED WELLS, PLUMBING, STORAGE TANKS... 2 QUARTS OF BLEACH WITH 10 GALLONS OF WATER -- OR SEE TABLE 1, ABOVE.  
*\*Use safety glasses, protective gloves, clothing and avoid direct skin or contact with these solutions.*

The effectiveness of disinfection should be checked after completing the above process by submitting a water sample to a laboratory to be analyzed for the presence of coliform bacteria. The sample should be collected in a container supplied by a qualified laboratory and in accordance with laboratory instructions. Samples should be collected only after the chlorine has been out of the system for at least 72 hours. Sampling bottles and instructions can be obtained from the DPHHS Microbiology Laboratory in the Cogswell Building in Helena, phone #444-3444.

For further and more detailed information, please call the Public Water Supply Section at 444-4400, or your local sanitarian. You can also get additional information on the web at the following website:

<http://www.cdc.gov/nceh/emergency/flood/wells.htm>

## ***SALVAGING DAMAGED FOODS***

### ***STORED FOODS***

To prevent diarrheal diseases and other illnesses, **the following items should be destroyed if they have been exposed to flood waters:** fresh meats, poultry, fresh vegetables, fruit; ready-to-eat foods such as lunch meats, cheese; home canned foods; medicines and cosmetics; packages that are not hermetically sealed (airtight), including flour, packaged frozen foods and other commodities in bags.

### ***SHELF STABLE AND CANNED FOODS***

Seepage can carry harmful bacteria into all but airtight containers, the contents of crown-capped bottles, screw-top glass containers (including canned food in glass jars) and unprotected flexible packages should not be used—it is very difficult to open them without spreading the contamination from the package closure to the food inside. Sealed metal cans if punctured, bulging or leaking are unsafe.

Sealed metal cans and hermetically-sealed packages with protective outer packaging, and which are in good condition may be salvaged but they must be carefully cleaned and disinfected before using the contents. If such packages are leaking, bulging or show evidence of puncture they should be destroyed.

The recommended procedure for cleaning and disinfecting cans of food:

1. Remove labels, but mark them in a way that will enable you to identify them after disinfection. Colored crayon, wax pencil, indelible marker, or adhesive tape may be used.
2. Wash cans in warm water containing soap or detergent. Then rinse the detergent from the can.
3. Soak the cans for at least 1½ to 2 minutes in a tub containing a disinfecting solution made by mixing a solution at the rate of 1 cup of household bleach\* to 5 gallons of water (or 2 TBSP per quart). Rinse the cans in clear water that is bottled, disinfected, or which has been previously boiled for at least 5 minutes. *\*Caution, this concentration of bleach will damage some fabrics and may have a pungent odor. Use waterproof gloves and do not wash your hands in this solution.*
- 4) Re-inspect the packages. If there is any doubt about the integrity of any package, do not use.

Hermetically sealed foods which normally require freezing or refrigeration should not be salvaged unless they have been continuously held within the proper temperature range, (see REFRIGERATED FOODS).

### ***REFRIGERATED FOODS***

During flood conditions, natural gas, electricity and other utilities may be down. Most food storage refrigerators are electric, and during floods, are often down for hours or days. Discard foods needing refrigeration (milk, eggs, meat, puddings, fish, canned hams labeled "Keep Refrigerated"), if the refrigerator has been down for more than six hours, or if the food has been warmed to above 45°F for more than 3 hours. These and other ready-to-eat foods will not be cooked before eating and could be dangerous. Where power is expected to be reinstated within minutes, keep the refrigerator or freezer door closed as much as possible. Some details are given in the table below.

Where power is out or turned off and alternate refrigeration is not available, foods normally requiring refrigeration should be placed in temporary insulated containers or ice chests and transported to

alternate refrigeration as soon as possible. In no case should they be left without refrigeration for more than 4 hours. Wherever possible the temperature should be held below 45°F. If dry ice is available it may be used as temporary refrigeration or to keep frozen foods frozen. If the times and temperatures are unknown, it is recommended that the food be discarded. "When in doubt, throw it out."

There are a number of condiments and other foods which are typically stored at room temperature until after the packaging is opened or the product is partly used, at which point they are usually refrigerated. These may include margarine, hard cheeses, fruit pies, fruit preserves, breads, fruits, salad dressing, jelly, relish, barbeque sauce, tartar sauce, horseradish, mustard, and catsup. These foods may be salvaged and placed in refrigeration if they have not been directly contacted by the floodwater.

***TABLE 2 REFRIGERATOR FOOD – When To Save & When To Discard***

FOOD TYPE	FOOD STILL COLD--HELD ABOVE 45°F FOR UNDER 3 HOURS	FOOD HELD ABOVE 45°F FOR OVER 3 HOURS
<b>DAIRY</b> - milk, cream, yogurt, baby formula	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
butter, margarine, shortening	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water
<b>EGGS</b> - fresh, hard cooked, egg dishes, egg salad, custard pies	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
custards, puddings, egg batter (uncooked)	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
<b>CHEESE</b> - hard cheeses, processed cheese	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water
soft cheeses, cottage cheese, brie etc.	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
<b>FRUITS</b> - bottled fruit juices, opened canned fruits, fresh fruits, raisins, dried fruit, dates,	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water
<b>VEGETABLES</b> - vegetables, cooked or raw; vegetable juices, opened, cut onions,	SAFE, if not in contact with flood water	DISCARD, if above 45F for more than 1 day or if above 50F for more than 8 hours
baked potatoes, chopped garlic in oil or butter	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
casseroles, soups, stews	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
<b>MEAT/POULTRY/FISH</b> - fresh or leftover	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
meat or poultry, raw, thawing	SAFE, if not in contact with flood water	DISCARD, after 6 hours
meat, tuna, shrimp, chicken, gravy, stuffing	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
lunch meat, bacon, sausage, dried beef, meat pizza, canned meats (open), ham	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
canned ham labeled "keep refrigerated"	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
<b>PASTRIES/PIES</b> - cream or cheese filled	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
Pies, fruit	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water
<b>BREADS</b> - Cakes, muffins, biscuits (cooked), corn chips, cooked cookies	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water
refrigerator biscuits, rolls, cookie dough, cooked pasta, pasta salads w/ mayonnaise, or vinegar base, macaroni & cheese	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
<b>MAYONNAISE</b> - Tartar sauce, horseradish, chopped garlic, salsa (opened or fresh)	SAFE, if not in contact with flood water	DISCARD, if above 45°F for more than 1 day or if above 50°F for more than 8 hours
<b>SPREADS</b> - Peanut butter, opened salad dressings, jelly, relish, barbeque sauce, olives, catsup, mustard, taco sauce, apple butter, . . .	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water

Frozen foods should immediately be transported to alternate freezers in well-insulated chests or boxes, or placed with dry ice. Those that have been thawed and then held above 45°F for more than four hours should be discarded. Those which are thawed for up to three hours and which still contain ice crystals and are cold as if refrigerated, may be re-frozen, and can usually be refrigerated and salvaged.

Some foods can be re-frozen even if they are above 45°F for a day or more. These include frozen juices, commercially packaged fruit, breads, rolls, cakes, pie crusts, commercial bread dough, flour, corn meal, and nuts. There is some risk of mold, yeasty smell or texture loss, including a sliminess on the exterior of the food, and if this occurs, discard the food.

Sealed bags of smoked fish require refrigeration at below 38°F. If such products are above that temperature for more than 4 hours, they should not be eaten.

## **FOOD PREPARATION**

Here are a few hints to insure safe and easier meals:

1. Water used for food preparation should be boiled, or disinfected with household bleach as described on page 2. Another alternative is to use bottled water which has not come in contact with flood water.
2. Wash hands and cooking utensils in clean or disinfected water (5 drops of household bleach with 1 quart of water (or up to 20 drops per gallon) and let stand for at least five minutes (preferably 30 minutes to an hour) as you would for drinking water (see #2 on page 2). This mild concentration should be adequate for cooking, handwashing, or drinking but it will taste better if stored in a clean vessel for a few hours before drinking.
3. Conserve fuel, water and energy, as well as the number of cooking and serving utensils, by preparing casseroles and one-dish meals, such as stews, pot roasts and thick, nourishing soups.
4. Boil and save the liquids of canned vegetables. Substitute them for water in recipes for soups, stews and other cooked dishes.
5. Drain and save juices from canned fruits. They may be mixed and combined with other canned fruit juices and used as beverages and in making gelatin salads/desserts, instead of scarce water.
6. If your oven is in working condition, use it to cook stews, vegetables and other foods. Oven cooking will require less attention and free you to do other tasks while the meal cooks.
7. If you lack refrigeration, cook only as much as can be eaten at one meal. Avoid leftovers. If you have refrigeration, you may want save time by preparing food for more than one meal in advance.
8. When purchasing formula ingredients, evaporated or dry skim milk for infants, be sure the containers are sealed. After opening in the home, be sure they are tightly covered to prevent contamination. In the absence of refrigeration, make up only enough formula for immediate use. If mixing powdered milk or dry formula, we recommend bottled water.
9. Avoid foods that are subject to quick spoilage and bacterial contamination, such as creamed foods, hash, custards and cream pies, salads and sandwiches mixed with mayonnaise or other perishables, unless refrigeration is available, or purchase individual portions (entrees) which you can heat, eat and discard the remainder.

10. Avoid keeping prepared or cooked food at room temperatures. Keep hot foods hot and cold foods cold. Plan meals to avoid leftovers unless you have refrigeration, or insulated coolers with dry ice.
11. In general, during the flood, commercially canned and packaged foods are recommended: canned dried milk; canned meats, fish, poultry; canned fruits, vegetables and juices; packaged, dried or dehydrated foods; canned or packaged biscuits, breads, crackers, cookies; frozen foods which have not been exposed to flood water or thawed.

## ***OTHER HEALTH AND HYGIENE ISSUES***

### ***ENTERING DAMAGED BUILDINGS***

If there are any doubts about the safety of a building which has been flooded, do not enter it. Seek professional advice first, and arrange for assistance wherever possible. Information and advice may be available from the Fire Department or the Disaster and Emergency Services agency in your area. Also, shelters, safe food and safe water may have been set up by a public service agency. Your local health department, or sheriff may also be able to help provide information.

Even with guidance and assistance as mentioned above, when you do enter a damaged building, check it for buckled walls, electrical hazards, loose bricks, cracks or any shifting of the foundation.

Do not pump flooded basements out too quickly, because the water-saturated ground around the basement could push the walls in. Also be alert for electrical hazards, downed power lines.

Follow the instructions of your utility company concerning the restoration of gas or electrical service. If unusual situations occur, call for guidance.

### ***CLEANING CLOTHING AND BEDDING***

Since disease-producing bacteria often carried by floodwater can remain alive for long periods in and on fabrics, care in laundering clothing and bedding is essential.

First, brush off all dirt, and if mud-stained, rinse in cool water until as much mud as possible is removed. Then wash as usual, using enough detergent to keep soil from redepositing on fabrics.

The use of a disinfectant in the rinse water is especially recommended to destroy bacteria. For white fabrics, household bleach is recommended. Your local market may have other products for other fabrics. Manufacturers directions should be followed carefully.

Some types of mattresses with absorbent ticking and covering when soaked with floodwater should be discarded since reconditioning is too difficult to be done at home. There are types, using synthetic coverings or less absorbent materials which can be air dried (takes several days), and sanitized, preferably in the sun, and may be suitable for re-use. The general recommendation is to discard them.

However, foam rubber pillows, if left in their covers, may be washed and air-dried. Do not use an automatic drier or dry cleaning solution.



## ***MEDICINES***

Discard all medicines exposed to flood waters and have all needed prescriptions refilled as soon as possible. If you have diabetes or other chronic disease for which medications are needed on an ongoing basis, contact your physician to be sure your prescriptions are current, and be cautious about substitutions. Your local public health nurse may be able to answer any questions you may have.

## ***IMMUNIZATIONS***

There is no indication for typhoid immunization in most flood emergencies. Typhoid immunization requires about six weeks to become effective. Immediate protection from diarrheal diseases can best be provided by using only bottled water, water which has been boiled for five minutes or treated chemically, and by discarding food which may have become contaminated, or which was not held at the proper temperature due to power outage.

Tetanus, Diphtheria (TD) booster is needed only on the recommendation of a physician in the case of an actual injury or wound. The flood itself imposes no additional risk of tetanus.

If hepatitis or other immunizations are indicated, the information will be provided to the radio, television and newspapers by the County Health Officer. The local public health nurse can answer questions.

## ***PERSONAL HYGIENE***

Several simple rules of personal cleanliness should be followed:

1. Wash hands with soap and water after using the toilet or participating in flood clean-up and handling flood-contaminated articles--and use bottled or disinfected water.
2. Be sure handwashing is done before and after smoking, using bottled or disinfected water.
3. Use boiled or disinfected water for brushing teeth and other personal hygiene.
4. Children are especially at risk of diarrheal diseases, wash your hands thoroughly after diaper changing, and before handling or playing with small children.

## ***PROCEDURE FOR CLEANING UP AFTER FLOOD***

Approach the site with caution. Hazards may include pesticides, harmful chemicals or sewage in flood waters, broken gas lines, electrical hazards, dead animal carcasses, displaced wildlife and many other hazards which are a potential threat to you and your family. Your electrical system may be damaged. Contact your utility company about restoring the service, or see an electrician before you restore breakers or attempt to use electrical equipment.

During the urgency of clean-up time, people are often inclined to overlook proper safety measures. Some people may become over-excited, or anxious. Below are a few reminders:

1. Set priorities, accomplish the vital tasks first and avoid physical overexertion--rest occasionally.

2. Regardless of the crisis, be sure children are safe and being cared for at all times. Never leave them alone or allow them to play in flood-damaged buildings or areas that might be unsafe. Keep them away from ponded water.
3. Give special attention to cleaning children's toys, cribs, playpens and play equipment. Items a baby or toddler may put in his mouth should be boiled, or disinfected as shown in Table 1A on page 3. Discard all stuffed toys and those that are not easily cleaned or are water logged.
4. Keep chemicals used for disinfection and poisons for insect and rodent control out of reach of children.
5. Wear protective clothing covering limbs, feet and hands while cleaning up debris and rubber gloves while scrubbing flood-damaged interiors and furniture.
6. Be sure electrical appliances are dry and in good condition before using. Fiberglass insulation which has been in contact with floodwaters should be replaced.
7. Monitor the radio and other media for current information, and do not travel when advisories warn against it. Let friends and relatives know that you are all right when you have a good opportunity to phone or fax. If phone lines are down or their use restricted, observe the public bulletins.
8. Be cautious about entering enclosed spaces where gasses may have accumulated—sewers, manholes, basements, or other enclosures. You cannot always smell toxic or explosive gas.
9. If you find a propane tank (whether a small 20# tank or a larger household tank) it may be a hazard to move or disturb it. Contact your fire department, the State Fire Marshals Office or DES coordinator.

Clean the building of all silt and refuse left by the flood. After dirt has been removed all wall and floor areas which have been touched by the floodwater should be washed down with washing powder or concentrated detergent solution (not soap) and then rinsed with a chlorine solution. If the presence of "Flood smell" remains, the building has not been thoroughly disinfected. Care should be taken to wash chlorine solution from any metal objects 10 to 15 minutes after application to prevent rusting.

Steam clean all carpeting. Many parts of the cleanup involve drying, possibly using ventilation fans.

Further guidance on cleanup is found in other sections of this document.

### ***EMERGENCY HOME SANITATION***

\* Personal hygiene, particularly hand washing is one of the most important measures for preventing illness from flood contamination. Always wash hands before eating!

\* Do not use contaminated water or water which is questionable, for any domestic use, including cooking, drinking, bathing, brushing of teeth etc., until it has been treated.

\* Look for a source of safe water such as a relative or friend in an area not affected by the flood, and obtain a supply in clean plastic jugs. A beverage cooler with a spigot near the bottom will be helpful for hand washing and getting started on cleanup safely.

- \* Persons on contaminated community water systems should boil the water or treat it with household bleach (see pp. 2 & 3) or use bottled water, until official notice is given that the water supply is safe.
- \* See the food information on pp. 4-7. All eating and drinking utensils should be sanitized besides being thoroughly cleaned. See Food Preparation on page 6.
- \* Wash solution for laundering clothes, bedding, etc, should include a disinfectant. Laundry bleach or other commercially available products may be used. Follow directions on containers.
- \* Inside surfaces of homes contaminated by floodwaters should be cleaned with a solution involving powdered cleanser (use according to manufacturers instructions). It is important to rinse affected walls and floors with a chlorine solution (1 cup of household bleach to 5 gallons of water). After 10 minutes rinse chlorine solution from metal or wood grain surfaces to prevent chemical reactions or rusting. Do not apply strong chlorine solution to rubber, organic material, carpeting or other absorbent surfaces.
- \* Dry ice may be of use as emergency interim refrigeration. Be sure to use gloves and remember dry ice freezes anything and everything it contacts. Placing it in paper bags or several layers of newsprint will make it easier to handle.
- \* Remember that during flooding, sewage often backs up into the house or basement. Rubber boots and waterproof gloves are needed during cleanup.
- \* Monitor radio and television bulletins for information concerning emergency housing, rations, emergency toilet facilities and other important guidance for residents of the flooded area
- \* Make a list of emergency phone numbers -- your local fire department, fire marshal, sheriff's office, the local Disaster and Emergency Services (DES) Coordinator, Public Water Supply Section of the MT Department of Environmental Quality, the local Environmental Health Office (Sanitarian) etc.-- and keep it handy.

Additional information can be found on the web at:

<http://www.cdc.gov/nceh/emergency/flood/precautions.htm>

## *MOSQUITO & VECTOR CONTROL*

### *DISEASE VECTORS*

Mosquitoes, rodents and ticks are among the principal vectors for diseases in humans in Montana. During flood conditions mosquitoes become the principal concern for residents of a community.

Increasing mosquito populations resulting from pooled water can increase the threat of mosquito borne diseases. More likely, however, increased mosquito populations will involve "pest" types of mosquitoes. Their effects will be expressed in terms of intense personal discomfort, and increased cases of secondary infections.

Not all water is ideal for mosquito breeding. Water which is open and deep ( little shallow area), running water, and water that is relatively free of emergent vegetation does not promote mosquito breeding. Temporary, shallow, standing water that lasts for five days during exceptionally hot weather can produce hordes of pest mosquitoes. Typically (at peak air temperatures of 80 - 90 degrees F.) the egg to adult developmental time will be 7 or 8 days. Mosquitoes capable of spreading disease lay their eggs on the surface of water which is typically shallow and has emergent vegetation. To establish if standing water is producing mosquitoes, dip out some water (near the surface and close to vegetation) at weekly intervals. Examine it for the aquatic stages mosquitoes (eggs, larvae/wigglers, and pupae/tumblers).

### *WEST NILE VIRUS*

Disease from West Nile Virus infection has been found in the U.S. since 1999, the virus has been present in Montana since 2002. Infection with West Nile Virus can be asymptomatic (no symptoms), or can lead to **West Nile fever** or **Severe West Nile Disease**. Symptoms of **West Nile Fever** include fever, headache, tiredness, and body aches, occasionally with a skin rash (on the trunk of the body) and swollen lymph glands. The symptoms of **Severe West Nile Disease** include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. It is estimated that approximately 1 in 150 persons infected with the West Nile virus will develop the more severe form of disease. West Nile Virus was a significant cause of human illness in the United States in 2002 and 2003. West Nile Virus is maintained in nature in a transmission cycle that involves primarily mosquitoes and birds.

Preventative measures that you can take to reduce your risk of becoming infected with West Nile Virus:

- a. limit time spent outdoors at dawn and dusk, when mosquitoes are most active;
- b. wear long sleeve garments;
- c. eliminate mosquito breeding areas by draining ponded water, removing old tires, metal or plastic cans, clogged rain gutters, wading pools not in immediate use, birdbaths, or other standing water;
- d. Apply insect repellent containing DEET to exposed skin (Follow Label Instructions)

If you have additional questions contact the Department of Public Health & Human Services at (406) 444-0273, or 444-2408.

## ***APPROACHING MOSQUITO CONTROL***

While organized mosquito abatement districts can do more to control mosquitoes than an individual or small independent group, property owners may be able to do much to protect their health and recreation opportunities. See *Reduction of Mosquito Production* below.

Persons living closest to a rearing site will achieve the greatest reduction of mosquitoes in their area when mosquitoes are controlled at their source. Although some types of adult mosquitoes may commonly fly from 3 to 5 miles, they thin out as they disperse from a rearing site and most move only far enough to feed. Consult your local mosquito control organization, local health department, or the Food and Consumer Safety Section (406) 444-2408, for further information.

## ***GUIDELINES FOR REDUCTION OF MOSQUITO PRODUCTION***

1. Remove unneeded standing water on your property. Most aquatic stages die if water is removed. Discard tires, cans, etc., which hold water. Restore drainage.
2. Stagnant pools or swampy places should be filled, drained, or deepened when practical. Remove debris and floating and emergent vegetation from those which cannot be filled or drained. Avoid having shallow pond margins--steep straight banks without emergent vegetation provide little cover for mosquito larvae.
3. Ornamental or stock watering ponds can be stocked with fish. Trout or other game fish keep ponds from rearing many mosquitoes if vegetation is not too dense. Mosquitofish are effective.
4. Surface irrigated fields should be properly graded. Low areas in fields that pond water are major sources of mosquito production.
5. Do not over irrigate fields and pastures. Using only necessary amounts of water (with adequate fertilization) increases hay quality and yield as well as reducing mosquito production.
6. Do not permit field laterals and drains to contain excessive amounts of vegetation. The on-field ditches should be regularly cleaned and maintained to reduce mosquito habitat.
7. Biodegradable mosquito control "oils" may be applied to standing water. (Examine water for larvae prior to any treatment). These oils are much less harmful to fish and vegetation than Kerosene or fuel oils and have been used where livestock take water (contact DEQ and/or Department of Agriculture for more information on larvacides).
8. Registered insecticides can be applied to mosquito rearing water on your property if applied according to label directions by qualified persons.

## ***TO MINIMIZE ADULT MOSQUITO ATTACK***

1. Minimize the amount of mosquito rearing water on your property according to the GUIDELINES. Keep lawns clipped and bushes trimmed to reduce the cover provided to adult mosquitoes.
2. Repair window and door screens, and add screening where indicated.
3. Repellents having a variety of active ingredients may be used for temporary relief. The U.S. Public Health Service and Consumer Reports state that the most effective repellent chemical is diethyl toluamide (DEET). Follow label directions and precautions. Care must be taken when using DEET on small children.
4. Registered insecticides can be used for adult mosquito control. They can be applied to adult resting places as short-term residual sprays, or space (contact) sprays can be drifted through areas on light air currents at dusk or dawn to kill adult mosquitoes present at that moment. All insecticides must be used in accordance with label directions and restrictions.

In the event of a federally declared disaster, federal assistance for the control of mosquito vectors may be available, provided a serious health hazard to humans has resulted or is developing which is clearly beyond State and local capabilities. Such vector control needs are unlikely but would be investigated by the state and local health agencies.

Mosquito control work to eliminate a nuisance condition clearly not a serious health hazard, is not eligible for federal assistance. You can obtain additional information regarding mosquito control programs from your local mosquito control district, local health department, or the Food and Consumer Safety Section (406) 444-2408.